CUSTOMER NO.: 38107

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of T. McNUTT, et al.	Examiner: M. NEWMAN
	Art Unit: 2624
Serial No.: 10/595,357	Confirmation: 7801
Filed: April 12, 2006	
For: **MANUAL TOOLS FOR MODEL BASED IMAGE SEGMENTATION**	
Date of Last Office Action: December 9, 2009	
Attorney Docket No.: PHUS030413US3 / PKRZ 2 00852	Cleveland, OH 44114 March 5, 2010

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The applicant requests review of the Final Rejection of December 9, 2009 in the present application. No Amendments are being filed with this request.

The Notice of Appeal and Notice of Appeal Fee are being filed contemporaneously herewith.

CERTIFICATE OF ELECTRONIC TRANSMISSION

I certify that this **PRE-APPEAL BRIEF REQUEST FOR REVIEW** in connection with Ser. No. 10/595,357 are being filed on the date indicated below by electronic transmission with the United States Patent and Trademark Office via the electronic filing system (EFS-Web).

March 5 2010
Date

Patricia A. Heim
Patricia A. Heim

DEPOSIT ACCOUNT

The Patent Office is authorized to charge any fees associated with this filing to our deposit account no. **14-1270**

Douglas B. McKnight, Reg. No. 50,447

REMARKS

The present application relates to the medical diagnostic imaging systems and methods. More specifically, it finds particular application in conjunction with the Radiation Therapy Planning System using a model based image segmentation of diagnostic medical images. Segmentation is used to identify the boundary of an organ or volume, e.g., tumor, to be radiated. A problem arises when the gray scale depiction of the organ or volume of interest is substantially the same as an adjoining organ or volume. In many cases, models can be used to aid automated image segmentation by providing knowledge of the organ shape as an initial starting point for the automated segmentation process. However, in some instances, the auto-segmentation of the image is not robust enough to fit the model to a specific organ or a section of the organ. It is desirable to be able to initiate the segmentation with a model and further complete an accurate segmentation manually when auto-segmentation is not practical or to enhance the auto-segmentation result for specific situations after auto-segmentation has been completed. The present application addresses these issues and provides a new and improved imaging apparatus and method which overcomes the above-referenced problems and others.

Krause and Schweikard are both drawn to a technique for approximating a 3D reconstruction where accuracy is not important. Krause has two shadowgrams that show the shadow or cross-sectional shape of the bone from two directions. Krause has a computer which stretches, scales, etc. a bone model until its shadow in the two directions substantially, within the limits of the fitting algorithm, matches the two shadows of the bone. Implicit in Krause is an acceptance that the bone model is an accurate depiction of the current patient's bone. The patient's bone could have holes in it, or gouges, which do not show up in the two shadows or curvature or other flows which are not depicted in the model. Schweikard is similar to Krause, but uses more than two shadows.

Neither Krause, nor Schweikard fit a 3D model to a 3D image. Rather, both perform a cheap and dirty "reconstruction" of a 3D image by machine fitting a 3D model to 2D shadowgrams.

The other references are graphics arts programs that go more towards enablement than towards obviousness. They show how images can be manipulated with software routines, but do not tell the reader why or what is to be achieved by

such manipulations. There is not motivation or teaching that one should modify the base references. The references do not put the reader in possession of using the disclosed techniques in fitting a 3D model to a 3D reconstructed image.

More specifically, regarding **claim 1**, Krause et al. does not disclose a reconstruction processor for reconstructing the image data into a three dimensional (3D) image representation of the organ and a set of global tools for best fitting the selected shape model to the 3D image representation of the organ or a set of manual tools for modifying selected regions of the selected shape model to precisely match the 3D image representation of the organ. The Office Action refers Applicant to Col. 11 lines 14-16, Col. 12 lines 4-7, 21-29, 42-46, and Col. 12 line 66 – Col. 13 line 15 which discloses an orthopedic surgery planner for scaling and deforming a predefined three-dimensional bone shape template until the bone shape template gives an image similar to the image data when projected onto a corresponding two dimensional plane. Krause et al. does not disclose best fitting a selected model to the three-dimensional image representation of the image data and using manual tools for modifying regions of the model to precisely match the model to the three dimensional image representations of the plurality of the image data.

The Office Action asserts these limitations are taught in the combination of Schweikard et al., McInerney et al., Newell et al. and Gauthier. Schweikard et al. discloses generating a three-dimensional approximation model of an organ from 2-D images but does not teach or suggest global or manual tools to precisely fit a model to the two dimensional images. McInerney discloses 3D deformable surface models result in faster more robust segmentation techniques than applying 2D contour models slice by slice. Newell et al. discloses a shape manipulation method where relocation information is received indicative of an intended change in position of a target location on a curve or surface shape by one or more control points. Gauthier discloses a system and process to drop and drag three dimensional icons, e.g. a basketball into a scene on a display. Neither Krause et al., nor Schweikard et al., nor McInerney et al., nor Newell et al., nor Gauthier, nor the combination thereof, teach or fairly suggest generating a three-dimensional image representation of the image data and using manual tools for modifying regions of a model to precisely match the model to the three dimensional image representation.

To render a claim unpatentable the Office must do more than merely "consider" each and every feature for this claim. The asserted combination of Krause

et al., Schweikard et al., McInerney et al., Newell et al. and Gauthier must also teach or suggest each and every claim feature and the claimed combination of features. It is respectfully submitted that there is no evidence or suggestions in Krause et al., Schweikard et al., McInerney et al., Newell et al., Gauthier, to combine them to create a reconstruction processor for reconstructing the image data into a three dimensional image representation of an organ and using global and manual tools for best fitting and matching a 3D model to the 3D image representation of the organ, as advanced by the Examiner, except from using Applicant's claims as a template through a hindsight reconstruction of the Applicant's claims.

Accordingly it is submitted that independent **claim 1** and **claims 2-7, 9-10, 12, and 14-15** that depend therefrom distinguish patentable over the references of record.

Claim 17 calls for reconstructing the image data into a three dimensional (3D) image representation of the object; dragging and dropping a selected 3D model on the 3D image representation of the object; and deforming local regions of the 3D model with a set of manual tools to match the 3D model to the 3D image representation of the object. It is respectfully submitted that neither Krause et al., nor Schweikard et al., nor McInerney et al., nor Newell et al., nor Gauthier, nor the combination thereof, teach or fairly suggest manually deforming regions of a three dimensional model to match a three dimensional image representation of an object.

Accordingly it is submitted that independent **claim 17** and **claims 18-19** that depend therefrom distinguish patentable over the references of record.

Claim 20 calls for applying manual shape-altering tools to the best-fit model such as to modify the model to conform to the image data. Krause et al. discloses a graphically user interface that allows a user to choose the bone contour from the 2D x-ray images of the bone and manipulate a three dimensional surgical plan simulation but does not disclose using the interface to effect fitting a model manually. Chaney et al. discloses using statistical correlation techniques to deform standard shape models in order to match the shape model to an object in an image, i.e., a computer implemented fitting. It is respectfully submitted that neither Krause et al., nor Chaney et al., nor the combination thereof, teach or fairly suggest modifying and fitting a shape model to conform to image data using manual shape altering tools.

In order to meet the conciseness requirements of a Pre-Appeal Brief, this paper addresses only the independent claims. The applicant reserves the right to argue each and every dependent claim individually in a subsequently filed Appeal Brief.

CONCLUSION

For the reasons set forth above, it is submitted that claims 1-3, 5, 10-27, 29, and 34-51 are not anticipated by and distinguish patentably over the references of record. An early allowance of all claims is requested.

Respectfully submitted,

Thomas E. Kocovsky, Jr.
Registration No. 28,383

FAY SHARPE LLP
The Halle Building, 5th Floor
1228 Euclid Avenue
Cleveland, OH 44115-1843
Telephone: 216.363.9000 (main)
Telephone: 216.363.9122 (direct)
Facsimile: 216.363.9001
E-Mail: tkocovsky@faysharpe.com

N:\PKRZ\200852\SMW0000194V001.DOCX